Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims

1-6. (Cancelled)

7. (Currently Amended) A method of testing an optical collimator having an optical axis using a mirror for reflecting light emitted from the optical collimator ~~positioned on an optical axis of light~~, the method comprising the steps of:

moving either one of the mirror and the optical collimator ~~at a first speed in a first direction intersecting the optical axis;~~

~~moving said either one of the mirror and the optical collimator at a second speed different from the first speed in a second direction intersecting the first direction simultaneously with the movement in the first direction~~; and

measuring the intensity of [[the]] light reflected by the mirror to the optical collimator and passing through the optical collimator while moving said either one of the mirror and the optical collimator, wherein the step of moving said either one of the mirror and the optical collimator includes:

reciprocally rotating said either one of the mirror and the optical collimator about a first axis substantially orthogonal to the optical axis at a first speed; and

reciprocally rotating said either one of the mirror and the optical collimator about a second axis substantially orthogonal to the optical axis and the first axis at a second speed different from the first speed simultaneously with the rotating about the first axis.

8. (Cancelled)

9. (Currently Amended) A method of testing a first optical collimator using a second optical collimator for receiving light irradiated from the first optical collimator and positioned on an optical axis of the first optical collimator, the method comprising the steps of:

moving either one of the first and second optical collimators ~~at a first speed in a first direction intersecting the optical axis~~;

~~moving said either one of the first and second optical collimators at a second speed different from the first speed in a second direction intersecting the first direction simultaneously with the movement in the first direction;~~ and

measuring the intensity of [[the]] light passing through the second optical collimator, while moving said either one of the first and second optical collimators, wherein the step of moving said either one of the mirror and the optical collimator includes:

reciprocally rotating either one of the first and second optical collimators at the first speed about a first axis orthogonal to the optical axis;

reciprocally rotating said either one of the first and second optical collimators about a second axis orthogonal to the optical axis and the first axis at a second speed different from the first speed simultaneously with the rotating about the first axis;

reciprocally sliding said either one of the first and second optical collimators at a third speed along the first axis; and

reciprocally sliding said either one of the first and second optical collimators at a fourth speed different from the third speed along the second axis simultaneously with the sliding along the first axis.

10. (Previously Presented) The light intensity testing method according to claim 7, further comprising the step of storing a position of said either one of the mirror and the optical collimator at which a measured light intensity reaches a maximum.

11. (Cancelled)

12. (Currently Amended) The testing method according to claim 7, wherein the step of moving said either one of the mirror and the optical collimator ~~in a first direction~~ further includes the step of :

reciprocally sliding said either one of the mirror and the optical collimator at a third ~~the first~~ speed along [[a]] the first axis ~~orthogonal to the optical axis~~[[,]] ; and ~~the step of moving said either one of the mirror and the optical collimator in a second direction includes the step of~~

reciprocally sliding ~~moving~~ said either one of the mirror and the optical collimator along [[a]] the second axis ~~orthogonal to the optical axis~~ at a fourth ~~the second~~ speed higher than the third ~~first~~ speed simultaneously with the sliding along the first axis.

13. (Currently Amended) A method of aligning a collimation lens and an optical fiber which form [[of]] an optical collimator having ~~positioned on~~ an optical axis ~~of light~~, comprising the steps of:

moving an optical element positioned to substantially oppose the optical collimator ~~at a first speed in a first direction intersecting the optical axis;~~

~~moving the optical element at a second speed different from the first speed in a second direction intersecting the optical axis and the first direction, simultaneously with the movement in the first direction~~;

measuring the intensity of light that is incident on the optical element and passes through the optical collimator while moving the optical element; and

adjusting the distance between the collimation lens and the optical fiber ~~aligning the optical collimator~~ based on the result of measurement, wherein the step of moving includes:

reciprocally rotating the optical element about a first axis substantially orthogonal to the optical axis at a first speed; and

reciprocally rotating the optical element about a second axis substantially orthogonal to the optical axis and the first axis at a second speed different from the first speed simultaneously with the rotating about the first axis.

14. (Previously Presented) The method according to claim 13, further comprising the step of storing a position of the optical element and the measured light intensity.

15. (Currently Amended) The method according to claim 14, wherein the step of adjusting ~~aligning~~ includes ~~the step of~~ fixing the optical element at a position at which the

measured light intensity reaches a maximum, and sliding ~~moving~~ the optical fiber ~~collimator~~ along the optical axis.

16. (Currently Amended) The method according to claim 13, wherein the optical collimator has a tube and a capillary disposed in the tube for receiving the optical fiber, and the step of adjusting ~~aligning~~ includes sliding ~~the step of moving~~ the optical fiber along the ~~optical axis~~ capillary and fixing the optical fiber to the capillary.

17. (Currently Amended) A method of aligning a collimation lens and an optical fiber which form [[of]] an optical collimator using an optical element optically coupled to the optical collimator, the optical collimator having an optical axis ~~positioned to substantially oppose an optical element disposed on an optical axis of light~~, the method comprising the steps of:

moving the optical collimator ~~at a first speed in a first direction intersecting the optical axis;~~

~~moving the optical collimator at a second speed different from the first speed in a second direction intersecting the optical axis and the first direction, simultaneously with the movement in the first direction~~;

measuring the intensity of [[the]] light that passes through the optical collimator while moving the optical collimator; and

adjusting the distance between the collimation lens and the optical fiber ~~aligning the optical collimator~~ based on the result of measurement, wherein the step of moving includes:

reciprocally rotating the optical collimator about a first axis substantially orthogonal to the optical axis at a first speed; and

reciprocally rotating the optical collimator about a second axis substantially orthogonal to the optical axis and the first axis at a second speed different from the first speed simultaneously with the rotating about the first axis.

18. (Previously Presented) The method according to claim 17, further comprising the step of storing a position of the optical collimator and the measured light intensity.

19. (Currently Amended) The method according to claim 18, wherein the step of adjusting ~~aligning~~ includes ~~the step of~~ holding the optical collimator at a position at which a measured light intensity reaches a maximum[[,]] and sliding ~~moving~~ the optical fiber ~~collimator~~ along the optical axis.

20. (Currently Amended) The method according to claim 17, wherein the optical collimator has a tube and a capillary disposed in the tube for receiving the optical fiber, and the step of adjusting ~~aligning~~ includes sliding ~~the step of moving~~ the optical fiber along the ~~optical axis~~ capillary and fixing the optical fiber to the capillary.

21. (Cancelled)

22. (Currently Amended) A tester for testing an optical collimator, the tester comprising:

an optical element positioned on an optical axis of light;

a scanning mechanism for rotatably and slidably ~~movably~~ holding the optical element ~~in a first direction intersecting the optical axis and for movably holding the optical element in a second direction intersecting the optical axis and the first direction, simultaneously with a movement in the first direction~~;

an optical sensor for measuring the intensity of light passing through the optical collimator; and

a controller for testing the ~~work~~ optical collimator based on the measured intensity of light, the controller controlling the scanning mechanism to reciprocally rotate the optical element at a first speed about a first axis orthogonal to the optical axis; reciprocally rotate the optical element about a second axis orthogonal to the optical axis and the first axis at a second speed different from the first speed simultaneously with the rotating about the first axis; reciprocally slide the optical element at a third speed along the first axis; and reciprocally slide the optical element at a fourth speed different from the third speed along the second axis simultaneously with the sliding along the first axis, while measuring the intensity of the light ~~move the optical~~

~~element at a first speed in the first direction and move the optical element at a second speed different from the first speed in the second direction~~.

23. (Currently Amended) A tester for testing an optical collimator having an optical axis, the tester comprising:

~~an optical element positioned on an optical axis of light;~~

a holder for holding the optical collimator ~~to oppose the optical element~~;

an optical element positioned on the optical axis to optically couple to the optical collimator;

a scanning mechanism for rotatably and slidably ~~movably~~ holding at least one of the optical element and the optical collimator ~~in a first direction intersecting the optical axis and for movably holding at least one of the optical element and the optical collimator in a second direction intersecting the optical axis and the first direction, simultaneously with a movement in the first direction~~;

an optical sensor for measuring the intensity of light passing through the optical collimator; and

a controller for testing the work based on the measured intensity of light, the controller controlling the scanning mechanism to reciprocally rotate said at least one of the optical element and the optical collimator at a first speed about a first axis orthogonal to the optical axis; reciprocally rotate said at least one of the optical element and the optical collimator about a second axis orthogonal to the optical axis and the first axis at a second speed different from the first speed simultaneously with the rotating about the first axis; reciprocally slide said at least one of the optical element and the optical collimator at a third speed along the first axis; and reciprocally slide said at least one of the optical element and the optical collimator at a fourth speed different from the third speed along the second axis simultaneously with the sliding along the first axis, while measuring the intensity of the light ~~move at least one of the optical element and the optical collimator at a first speed in the first direction and move at least one of the optical element and the optical collimator at a second speed different from the first speed in the second direction~~.

24. (Previously Presented) The tester according to claim 23, wherein the controller includes a storage device for storing a position of the optical collimator or the optical element, and a measured light intensity.

25. (Previously Presented) The tester according to claim 23, wherein the optical collimator is fixed, and the optical element is moved by the scanning mechanism.

26. (Currently Amended) The tester according to claim 23, wherein the optical element is a mirror, and the sensor measures the intensity of ~~reflected~~ light ~~from~~ reflected by the mirror and passing through the optical collimator.

27. (Currently Amended) The tester according to claim 23, wherein the optical element is a collimator ~~lens~~, and the sensor measures the intensity of light which transmits the collimator ~~lens~~.

28. (Currently Amended) An apparatus for aligning an optical collimator ~~having a tube, a collimation lens, a capillary disposed in the tube, and an optical fiber disposed in the capillary~~, the apparatus comprising:

an optical element positioned on an optical axis of light;

a holder for holding the optical collimator to oppose the optical element;

a scanning mechanism for rotatably and slidably ~~movably~~ holding at least one of the optical element and the optical collimator ~~in a first direction intersecting the optical axis and for movably holding at least one of the optical element and the optical collimator in a second direction intersecting the optical axis and the first direction, simultaneously with a movement in the first direction~~;

an optical sensor for measuring the intensity of light passing through the optical collimator; and

a controller for controlling the scanning mechanism, the controller controlling the scanning mechanism to reciprocally rotate said at least one of the optical element and the optical collimator at a first speed about a first axis orthogonal to the optical axis; reciprocally rotate said

at least one of the optical element and the optical collimator about a second axis orthogonal to the optical axis and the first axis at a second speed different from the first speed simultaneously with the rotating about the first axis; reciprocally slide said at least one of the optical element and the optical collimator at a third speed along the first axis; and reciprocally slide said at least one of the optical element and the optical collimator at a fourth speed different from the third speed along the second axis simultaneously with the sliding along the first axis, while measuring the intensity of the light, and the controller determining an optimal relative position between the optical element and the optical collimator based on the measured intensity of the light ~~move at least one of the optical element and the optical collimator at a first speed in the first direction and move the optical element at a second speed different from the first speed in the second direction~~; and

an adjuster for movably holding the optical fiber along the optical axis, the adjuster changing the distance between the collimation lens and the optical fiber.

29. (Cancelled)

30. (Previously Presented) The apparatus according to claim 28, wherein the controller includes a storage device for storing a moving distance of the optical fiber along the optical axis.

31. (Original) A method of aligning a work having an optical fiber and a collimation lens, the method comprising the steps of:

rotating a mirror disposed on an optical axis of the work to irradiate the work with reflected light about a first axis and a second axis orthogonal to the optical axis over a relatively wide range;

capturing reflected light passing through the work while rotating the mirror;

measuring the intensity of the reflected light while rotating the mirror in a relatively narrow scanning range near a position of the mirror at which the reflected light is captured, the mirror being rotated about the first axis at a first speed and being rotated about the second axis at a second speed higher than the first speed;

storing a maximum value of the measured light intensity and the position of the mirror;

moving the optical fiber along the optical axis by a predetermined distance;

measuring the intensity of the reflected light while rotating the mirror in a relatively narrow scanning range near the stored position of the mirror, the steps of rotating, storing and moving being repeated until the maximum value of the measured light intensity becomes smaller than the stored maximum value of the light intensity;

returning the position of the optical fiber by the predetermined distance when the maximum value of the measured light intensity is smaller than the stored maximum value of the light intensity; and

fixing the optical fiber at the returned position.

32. (Original) The method according to claim 31, wherein the first speed is in a range of 0.1 to 10 Hz, and the second speed is in a range of 100 Hz to 1 kHz.

33. (Original) The method according to claim 31, further comprising the step of sliding the mirror along the first axis and the second axis after rotating the mirror in the relatively narrow scanning range.

34. (Currently amended) The method according to claim 7, wherein said either one of the mirror and the optical collimator is reciprocally rotated ~~moved~~ within a predetermined scanning range in the first direction and the second direction, and wherein the second speed is in a range of 100 Hz to 1 kHz, and the first speed is in a range of 0.1 to 10 Hz.

35. (Previously Presented) The light intensity testing method according to claim 9, further comprising the step of storing a position of said either one of the first and second optical collimators at which a measured light intensity reaches a maximum.

36-37. (Cancelled)

38. (Currently Amended) The method according to claim 9, wherein said either one of the mirror and the optical collimator is reciprocally ~~moved~~ rotated and reciprocally slid

simultaneously within a predetermined scanning range ~~in the first direction and the second direction~~, and wherein each of the second speed and the fourth speed is in a range of 100 Hz to 1 kHz, and each of the first speed and the third speed is in a range of 0.1 to 10 Hz.

39-40. (Cancelled)

41. (New) The method according to claim 12, wherein each of the second speed and the fourth speed is in a range of 100 Hz to 1 kHz, and each of the first speed and the third speed is in a range of 0.1 to 10 Hz.

42. (New) The method according to claim 13, wherein the step of moving further includes:

reciprocally sliding the optical element at a third speed along the first axis; and

reciprocally sliding the optical element along the second axis at a fourth speed different from the third speed simultaneously with the sliding along the first axis.

43. (New) The apparatus according to claim 28, wherein the optical collimator to be aligned includes a collimation lens, an optical fiber, a capillary for slidably receiving the optical fiber, and a tube for connecting the capillary and the collimation lens so that the optical fiber and the collimation lens are optically coupled each other, wherein the relative position between the optical fiber and the collimation lens is defined by the capillary and the tube except for the distance between the optical fiber and the collimation lens, and wherein after the adjustment by the adjuster, the optical fiber is secured to the capillary at the adjusted position where a measured light intensity is a maximum.